

What is claimed is:

- 1 1. A method for making a ferrous metal alloy foil which has a high oxidation
2 resistance and high dimension stability in an automotive exhaust gas atmosphere
3 comprising the steps of:
 - 4 a) providing a first layer of a first metal material;
 - 5 b) sandwiching the first layer of the first material between a first and second
6 layer of one or more second metal material(s) which is different from the first
7 material thereby producing a sandwiched composite;
 - 8 c) compaction rolling the sandwiched composite to a finished thickness metal
9 composite foil;
 - 10 d) processing the finished thickness metal composite foil into a honeycomb-like
11 structure having channels for air flow;
 - 12 e) placing the honeycomb-like structure into a furnace which has been
13 preheated to near or at an annealing temperature, in an air atmosphere, and
14 heating at an annealing temperature for a period of time which is sufficient to
15 cause diffusion of said one or more second metal materials into said first
16 metal materials to produce a monolithic honeycomb-like annealed alloy foil
17 structure;
 - 18 f) cooling the furnace and the monolithic honeycomb-like annealed alloy foil
19 structure to room temperature;
20 wherein the one or more of the first metal material or second metal material(s)
21 contains iron.
- 1 2. The method of claim 1, wherein the first metal material comprises Fe and Cr.
- 1 3. The method of claim 2, wherein the Cr content is about 16 to about 24 wt%.
- 1 4. The method of claim 1, wherein the first metal material is selected from
2 stainless steel 430, 434 and 446.
- 1 5. The method of claim 2, wherein the second metal material comprises
2 aluminum.
- 1 6. The method of claim 5, wherein the aluminum is essentially pure aluminum or

2 an aluminum alloy.

1 7. The method of claim 1, wherein the first metal material is FeCr and the second
2 method material is Al.

1 8. The method of claim 7, wherein the furnace is preheated to an annealing
2 temperature and the annealing temperature is from about 900° C to about 1,200° C.

1 9. The method of claim 8, wherein the period of time for annealing is between
2 about 10 minutes and about 120 minutes.

1 10. The method of claim 9, wherein a monolithic FeCrAl alloy is formed, further
2 wherein a pre-oxidized surface is formed.

1 11. The method of claim 10, wherein the pre-oxidized surface comprises Al-oxide.

1 12. The method of claim 7, wherein the preheated temperature is about 720° C.

1 13. The method of claim 12 further, wherein the furnace is heated to an annealing
2 temperature of between about 900° C and 1,200° C within about 30 minutes after the
3 honeycomb-like structure is placed in the furnace and the honeycomb-like structure is
4 heated for about 2 hours at the annealing temperature.

1 14. The method of claim 13, wherein a monolithic FeCr-Al alloy is formed, further
2 wherein a pre-oxidized surface is formed thereon.

1 15. The method of claim 14, wherein the pre-oxidized surface comprises Al-oxide.

1 16. A product produced in accordance with the process of claim 1.

1 17. A product produced in accordance with the process of claim 11.

1 18. A product produced in accordance with the process of claim 15.

1 19. A catalytic converter comprising a product produced according to the process
2 of claim 11.

1 20. A catalytic converter comprising a product produced by the process of claim
2 15.

1 21. A process of making a ferrous metal substrate catalytic converter comprising
2 the steps of:

- 3 a) providing a first layer of a first material selected from the group consisting of
4 chromium containing ferrous metals or aluminum containing materials;
- 5 b) sandwiching said first layer of said first material between a first and second
6 layer of a second material selected from the group consisting of chromium
7 containing ferrous metals or aluminum containing materials not chosen for the
8 first material thereby producing a sandwiched composite;
- 9 c) compaction rolling the sandwiched composite to a finished thickness metal
10 foil;
- 11 d) processing the finished thickness metal composite foil into a honeycomb-like
12 structure having channels for air flow;
- 13 e) placing the honeycomb-like structure into a furnace which has been
14 preheated to near or at an annealing temperature, in an air atmosphere, and
15 heating at an annealing temperature for a period of time which is sufficient to
16 cause diffusion of said one or more second metal materials into said first
17 metal materials to produce a monolithic honeycomb-like annealed alloy foil
18 structure;
- 19 f) cooling the furnace and the monolithic honeycomb-like annealed alloy foil
20 structure to room temperature;

21 wherein the cooled product of step f) has a pre-oxidized surface comprising Al-oxide.

1 22. The process of claim 21, wherein the first material is FeCr and the second
2 material is pure Al.

1 23. A product produced according to the process of claim 21.

1 24. A catalytic converter comprising a product produced by the process of claim
2 21.